

Abstract of the Disclosure

A high performance bipolar transistor device is realized from a series of layers formed on a substrate, the series of layers including a first set of one or more layers each comprising n-type dopant material, a second set of layers forming a p-type modulation doped quantum well structure, and a third set of one or more layers each comprising n-type dopant material. The first set of layers includes an n-type ohmic contact layer. A collector terminal metal layer is deposited and patterned on one layer of the third set. P-type ion implant regions and a patterned base terminal metal layer (which contact the p-type modulation doped quantum well structure) are formed in an interdigitated manner with respect to a patterned emitter metal layer formed on the n-type ohmic contact layer. Preferably, a capping layer that covers the sidewalls of the active device structure (as well as covering the collector metal layer) is used to form the interdigitated base and emitter metal layers of the device. One or more of the metal layers of the device are preferably formed from a composite metal structure (such as a NiInW composite metal structure) that is transformed into a low resistance metal layer by a rapid-thermal anneal operation.